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In this issue

Officers N.S.P.E.—Roster of State Societies 2
President's Message 3
Engineering Courses—*H. S. Rogers* 5
The Professional Engineer—*W. R. Woolrich* 9
American Engineer—Announcement 12
Legal and Contractual Relations and Grading of Engineers—*Oliver H. Allen* 13
N.S.P.E. Enlarges Headquarters 16
A Texas Travelogue—*Robert H. Craig* 17
Atlantic City Convention 18
Secretary en Route 20
Court Compels Licensing 21
Society Appoints Aid to Secretary 21
Committees—N.S.P.E. 22
U. S Appeals for Engineers ..... Cover (Inside Back)

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PRESIDENT'S MESSAGE

RECITES SOME PERSONAL IMPRESSIONS
NOTES CHANGE IN *The American Engineer*
URGES NATIONAL AND PROFESSIONAL COLLABORATION
PAYS JUSTIFIED TRIBUTES

To the Members of the National Society of Professional Engineers:

FIRST, LET ME THANK the many, many engineer members who have written me personal letters during the past month. It gives one a feeling of importance to receive messages of congratulations and pledging support—first, from New York, then from Texas, and from Illinois, and from Virginia, and from Washington, and many other states. Many letters contained suggestions which have been filed for early attention. Also let me explain that I have not been able to write you all individually. Will you take this as a personal reply and a hearty *thank you* to each one.

President
of
The National Society
of
Professional Engineers

Dean
Schools of
Engineering and Mining
The Univ. of Pittsburgh

Elmer A. Holbrook

Early in the year, with the help of National Secretary Larson, I forwarded letters to the members we had chosen for committee chairmen and members. Almost without exception they have agreed to serve. It goes without saying that when one of our committee appointees was shortly afterwards chosen president of the American Society of Civil Engineers, I gladly excused him and take this opportunity to congratulate Engineer Ernest B. Black on behalf of our own membership.

You must have had a feeling of pride, as I did, when our president of last year, Engineer Beretta of Texas, entered the service as captain of the Air Corps. A letter recently received shows that he is in charge of important work in Newfoundland. It was unfortunate that our Society should lose his active participation in the projects he had initiated in Washington and in several of the states. However, as time goes on, more and more of our younger members will enter the service. We who remain in civil life must carry on our common profession. A prominent government official told me the other day—"War is no longer a mass of men fighting apart from the rest of the population, it is a technological phenomenon, involving all-out production in which the trained engineer is a necessity." Our profession suddenly has become very important; let us live up to our responsibility.

Soon after taking office, your president was called upon to consider the claims of a number of concerns in various parts of the country who were interested in contracting for the publication of our magazine, THE AMERICAN ENGINEER. After consultation with several directors and past presidents of the Society, it seemed that a firm in New York City was able to offer us the most favorable contract. Incidentally, I learned that the engineering advertising business is centralized in New York, which seemed important in a business way. So with this number, we begin our new relations for the publication of THE AMERICAN ENGINEER. At my earnest solicitation, Engineer Arthur Sheridan, past president of our Society, agreed to take the responsibility of editorship. His professional headquarters are in New York and he will be able to work closely with our publishers. I invite the members, and especially the secretaries of the State Societies, to write him often in order that he truly can be the mouthpiece of our widely separated membership.

Let me, at this time, pay tribute to the work of Engineer Robert Craig of Harrisburg, Pennsylvania, for the past five years editor of THE AMERICAN ENGINEER. He has unselfishly given his own time and energy to the work of building up the magazine. A backward glance over the years shows that he has performed well. The appreciation of every member goes to Engineer Craig.

To our general membership, let me say that you do not realize what a great Society we are until you begin to travel around. On January 8, I spoke at the annual meeting of the Lehigh Valley Section of the Pennsylvania Society. Here is a vigorous band of prominent engineers from Bethlehem, Allentown, Easton, and surrounding communities. Present also were engineering deans and professors from Lehigh University and Lafayette College. I was most graciously received and listened to. I thank all the officers. My notebook comment the next day was—With 500 similar local units in the several states, we could move America into recognition and appreciation of our profession.

On January 9, I spoke to the 250 engineering seniors at the Pennsylvania State College at the personal request of the Engineering School dean, Dr. Hammond. My theme was "The Professional Engineer." One of the professors present said "It is a good sign when we older engineers are willing to talk to these younger ones on ethics and responsibility, rather than on technical fact and formulae."

On January 24, I attended, and spoke before, the Seventh Annual Convention of the Oklahoma Society of Professional Engineers at Tulsa. I was welcomed at the Hotel Mayo by City Engineer Wooten, chairman of the Convention Committee, who quickly introduced me to President van T. Moon of Oklahoma City. They, in turn, introduced me to the many members present and gave me a copy of their printed convention program and of their State publication *The Oklahoma Engineer*. I was particularly impressed with the number of prominent engineers present. An added personal touch was that four Oklahoma professional engineers, all graduates of the University of Pittsburgh, called on me in a group. In the afternoon I spoke before the Convention on the subject "The Place of the Engineer". Later, I attended a meeting of the directors called by the new president, Stanley Learned, of Bartlesville, chief engineer of the Phillips Petroleum Co. Let me assure the officers that the National Society stands squarely behind their present program.

Under the able leadership of the present State officers, the Oklahoma Society is moving forward to take its deserved place of leadership in the National Society, where it now is represented by vice president Wolfe and national director Moon. My notebook comment written on the way home was that engineers seem to be the same kind of men no matter where you meet them—in Connecticut, or Indiana, or California, or Oklahoma. Within half an hour after reaching Tulsa, I felt myself an Oklahoma engineer, because they are my kind of men.

And now fellow engineers, a very serious word in closing. This coming year is going to make us or break us as a people, as a nation, as a society, and as a profession. If I did not believe that our Society is an integral part of our national effort, I would not waste an ounce of energy on it. More than half of the young engineers and increasing numbers of our mature licensed and registered men are entering the government service. Questions vital to you, fellow engineers in Massachusetts, and New Jersey, and Ohio, and Minnesota, and California, are being decided in Washington. Your Society is the only one there which represents your profession. It is important to your State Society, to your local Chapter, and to you individually that the calm engineering voice be heard increasingly in our national councils. They need our kind in Washington, and we need you to keep our voice heard there. Let us continue to be of one mind.

E. A. Holbrook,

President, N. S. P. E.

ENGINEERING COURSES

OBJECTIVES,

ORGANIZATION AND DIRECTION

by

H. S. ROGERS, *President*
POLYTECHNIC INSTITUTE OF BROOKLYN

THE OBJECTIVES of engineering courses are the perennial topic of discussion before educational and engineering societies. The annals are filled with individual views, many of which, although limited to particular fields, come under a general pattern of basic ideas. * * * (Refer especially to Journal of Engineering Education, June 1928, H. S. Rogers; and Report of Committee on Aims and Objectives of Engineering Education—Society for Promotion of Engineering Education, 1939.) Within the scientific-technological classification are included such subject-matter fields as physics, chemistry, mathematics and engineering, and within the humanistic-social, such fields as English, literature, languages and social studies. It is with the scientific-technological courses that this discourse is concerned.

The aims of courses, obviously, are more restricted in their scope and more particular in their goals, while the aims of curricula must of necessity, arising from the breadth of human knowledge, be eclectic and therefore varied in their general pattern. Some years ago it might have been necessary to sustain one's opinion concerning the objectives of the scientific-technological courses with a documentation of the opinions of others. But the studies of engineering education reported by Dr. C. R. Mann for the Carnegie Foundation and those made by the Society for the Promotion of Engineering Education under Dr. W. E. Wickenden have quite definitely established the primary aim as the teaching of fundamentals. Agreement as to such a general aim presupposes a specific definition of those fundamentals underlying the body of recorded engineering knowledge and constituting the objectives of engineering training. This assumption is not completely fulfilled.

Frequently mathematics, physics, chemistry, drawing and such courses constituting the elements of engineering curricula are designated as fundamentals, and certain it is that they do, in their scope, embody those principles which are fundamental to all engineering. For the purpose of discussion, however, let us define the term "fundamentals" as that group of general principles, physical laws, objective data, and basic assumptions which are found in the fields of physical science and mathematics, and are utilized in a specific manner for solving problems in the various fields of engineering. In my opinion there is a more or less definite procedure for effective presentation and study of these fundamentals.

Before discussing the matter of objectives in engineering courses and the method of presentation of engineering subjects, however, let us review those attributes and characteristics considered essential for success in engineering careers. Here we will eliminate the so-called broader and collateral abilities and aptitudes and direct our attention to those which specifically characterize engineers. There is more or less general agreement that they are adequately covered in classifications similar to the following:

1) Knowledge of theory, which implies a mastery of fundamental principles, knowledge of methods, a command of basic facts underlying the branches of engineering, and an ability to apply these constructively to the solution of engineering problems;
2) Knowledge of practice, which implies an accumulated body of information about the types of machines and devices available for the accomplishment of practical objectives, and concerning standards, methods and procedures in the manufacturing and constructive arts;
3) Leadership in human efforts for accomplishing engineering projects, which implies the ability both to organize and to direct;
4) Personal efficiency manifested through habits of industry, initiative, accuracy, thoroughness, neatness, and promptitude—all those attributes so characteristic of efficient industry today;
5) Fundamental character as manifested in honest practice and ethical procedures in relations with colleagues and clients.

All of these attributes are possessed in varied measure by individual engineers and all of them are possessed in different measure by the various ranks within engineering, such as technicians, junior engineers, licensed engineers, distinguished engineers, and eminent engineers.

For the purpose of a more graphic presentation of these facts, they may be arranged schematically in a manner indicating the measure of achievement, capacity,

ability or traits as shown in the attached diagram.

It is generally recognized, as witness the application forms for membership in our Founder Societies and the examinations given for licensure, that the competent engineers must possess all of these in a certain measure of a more or less subjective nature. This measure is more or less objectively determined, however, by the nature of experience and responsibility which applicants have discharged in the professional fields.

A pattern of attributes and achievements of any engineer may readily be drawn across these measures as a profile. One individual may for example, excel in the knowledge of theory without possessing a collateral knowledge of practice or without exercising large responsibility in leadership. Another may be eminent because of his achievement in some field of practice even though somewhat limited in his knowledge of the advanced engineering sciences.

The college graduate will possess a specific measure of knowledge of principles and methods, but will lack, however, in his information about, or understanding of, the engineering arts. He may have had little opportunity to demonstrate leadership and yet possess great inherent capacity for it. He should have been disciplined in habits of personal efficiency. And he should respect and honor his profession by honest, fair and upright conduct.

There are very obvious reasons for focusing upon the mastery of theory and drill in its constructive applications in the college class-room. The most obvious is that such mastery and resulting facility are fundamental to growth of individual power and ability. Other reasons, however, circumscribe the objectives of the class-room. It would obviously be impossible to bring the experience of the field to the college campus without great expense and artificiality. We must depend, therefore, upon qualifying experience after graduation for the attainment of that professional competency which demands a knowledge of the arts. In the class-room and in the laboratory, however, we can bring together the conditions and the facilities through which the embryo engineer may grow most rapidly in his knowledge of fundamentals and be disciplined most effectively in habits of personal efficiency.

The evolution of engineering thought, as we know it today, and of engineering practice, based upon that thought, has given us a body of knowledge based upon facts and principles that we may place in the following five broad classifications:

1. Generic principles including such basic concepts as the laws of statics, the law of conservation of energy, the principles of thermodynamics, the laws of electromagnetism and so forth;
2. Certain hypotheses such as plane sections before bending remain plane after bending, that certain simple structures are statically determinant, and many other analogies which have been accepted in the technology of various fields;
3. Empiricisms such as the properties of materials which have been observed and measured in the laboratory and which are recorded abundantly in handbooks;
4. Derived principles which have been developed in various fields of practice for the purpose of facilitating the application of generic principles, of accepted hypotheses, and of measured empiricisms to the solution of more or less standard problems;
5. Specifications and standards which have been developed through the extensive field, shop, and office practices of engineering groups.

These principles, hypotheses, empiricisms, standards and practice are the foundations of engineering thought and the working tools of the engineer.

A sound program of objectives for engineering training must include a critical mastery of the fundamentals together with the development of certain facility in their application. These two associated elements, first—critical understand, and second—a power of constructive application are complementary. One may not possess either in any considerable degree without some measure of the other.

Since engineering theory is founded upon generic principles, hypotheses and empiricisms, the logical approach to a comprehensive understanding of it is through a mastery of these fundamental principles. These are traditionally presented in such basic courses as mechanics, electrical circuits, thermodynamics, engineering materials, et cetera.

On the other hand, derived principles which have evolved in the development of technology and specifications and standards which have developed, in large part, as the product of engineering arts in field and shop, have generally been presented in such applied courses as electrical machinery, steam power, and structural design. While in basic courses the emphasis has been upon critical understanding, in applied courses the major emphasis has traditionally been upon facility in use.

In the progress toward the mastery of knowledge and the devolpment of the power of constructive engineering thought, at least four separate and distinct stages may be discerned.

1) A recognition of the abstract generalized principle within the boundaries of a specific problem;
2) The association of this principle with others as a working tool for the solution of a variety of problems presenting different external appearances;
3) The development of a critical understanding of the abstract principle in association with the methods of its application;
4) Facility in its constructive application to the solution of new problems.

The first of these is in large measure the responsibility of the instructor in the presentation of each of these general purpose tools. The second quite naturally grows out of the use of the principle in the solution of a variety of problems and becomes therefore the responsibility of the student. The third will result from a critical examination of a large number of problems for the purpose of identifying and generalizing the concepts used in their solutions; this may be done most expeditiously under the guidance of the instructor. The fourth, like the second, implies the cultivation of the facility in the utilization of principles for the solution of new problems. It grows out of the drill and experience of the student.

The principles around which basic courses are organized are of a rational and generic nature such as the laws of equilibrium, the law of conservation of energy; or they are of a hypothetical nature such as the stress and strain relationship in a beam under flexure. In the development of critical understanding of them the most important factor is a recognition of the physical concepts upon which they are rationally based. Here is the particular in which most crimes of omission in teaching are committed and here physical meanings are too frequently covered up by mathematical symbolism. The physical concepts are frequently so obscure in the presentations of text-books that students in their study of them do little more than verify the algebraic method of derivation. This may be true, for example, in such subjects as internal shear in beams, and flow through a submerged weir. Text-books are generally written for the logical presentation of concepts in rigorous mathematical terms and it is this which adds to the obscurity of physical relationships.

The free body sketch and graphical methods are universally used in presenting physical concepts underlying abstract analyses. We can go still farther with such methods. We may also use laboratory demonstration to advantage. There is a great opportunity to improve much of our teaching by the more universal use of sketches, models and diagrams for the presentation of these abstract physical meanings which are the foundations of engineering thought.

Empirical principles are, on the other hand, best studied in the laboratory. Most of them are very definitely limited in their applications and it is most important that students understand their origins and limitation. We will improve our teaching and conserve our time as we pay more attention to these vital factors.

In contra-distinction to the outline of a basic course around an organization of principles, the outlines of applied courses are usually made around types of machinery or structures as, for example, the outline of courses in structures, in gas engines, or electrical machinery. The major purpose of applied courses is the development of a critical understanding of derived principles and of facility in their application to the design of machines or structures or for the explanation of their performance. In a study of derived principles, it is essential that we give constant and unremitting attention and emphasis to the origin and limitations of working data and formulas. I have personally seen the roof of an industrial building fail under a snow load because some designer had utilized an empirical column formula for the design of a strut which had a ratio of length to least dimension far beyond the limitations of that formula as determined by the data from which it was derived.

Facility in constructive use is based upon intensive drill in methods but should not be developed at the expense of the recognition of the underlying principles and of the processes through which the adopted tools have been derived. Students are prone to follow method without critical understanding of the underlying principles. Instructors are prone to emphasize method at the expense of principles.

In the long run, however, facility in the use of principle, either generic or derived, to the solution of new problems is based upon a critical understanding and a conscious recognition of the engineering thought processes. No other one thing ties the engineering profession so closely together as this way of thinking.

The need to understand the physical meanings underlying principles and hypotheses and to know the origins and limitations of empiricisms and of derived rules give us the most vital suggestions regarding the organization and presentation of engineering courses. The practices or arts in civil, electrical, or mechanical engineering are widely differentiated but the method of problem solving is common to all engineering fields.

In addition to this common characteristic in the way of thinking, certain other attitudes and aptitudes are characteristic of all engineers, such as a practical philosophy regarding engineering work, disciplined habits of work, and an ethical attitude toward colleagues and clients. These are, likewise, attributes which should be developed in college and which are tested and appraised in the licensure of engineers and in their admission to professional societies.

Because engineering is directed toward the improvement of comforts, the relief of labor and the extension of the environment of mankind, and all of these embody the use of energy, materials and capital, it is dominated by a practical philosophy of efficiency in the use of energy, conservation in the use of materials, and economy in the expenditure of money. All of these purposes should be woven into the pattern of engineering courses.

This emphasis upon efficiency, conservation and economy finds its counterpart in the demand for personal efficiency by the profession and in a college training emphasizing accuracy, industry, thoroughness, neatness, promptitude, et cetera.

With a growing sense of professional consciousness and an emphasis upon ethical conduct, a movement is now evolving to interest faculties and students in the

study of professional ethics.

The building of engineering curricula and the coordination of courses into sequences should be determined by an effective progress toward the mastery of fundamentals and facility in their constructive application to various practical fields. The attitudes and points of view expressed in practical engineering philosophy, personal habits, and ethical conduct find their place in all courses regardless of the particular emphasis in scientific thought or technology. The integration of all these elements in a program of training requires a closer study of course objectives and of engineering curricula than is usually made. Courses have been too frequently assembled rather than coordinated. Some institutions are, however, making substantial progress in unifying their objectives and in integrating their programs.

The pressure of the need for broader training requires a continual restudy and appraisal of engineering courses and objectives for the purpose of securing more satisfactory results in less time. It is my own conviction that this can be done when teachers and engineers alike better understand the engineering way of thinking and when the student is led to comprehend the thought process along with his pursuit of mastery of and of power constructively to use engineering principles and methods.

MEASURES OF PROFESSIONAL COMPETENCY AND CONSCIOUSNESS

	Sub-Professional Technician	Junior Engineer	Competent Practitioner	Distinguished Engineer	Eminent Engineer
Knowledge of Principles and Methods	Elementary Knowledge of Mathematics and Technology	Knowledge At College Level	Broad Knowledge Of Principles and Methods	Contributor to Theory and Technology	Creative Contributions Of Import
Practical Facility in Applications	Trained in Standard Practices	Knowledge of and Facility in Methods, And Practices	"Active Practice" In Engineering "Ability to Design"	Leader in Developments Of Practice	Creative Originality in Applications and Constructive Arts
Ability to Organize and To Lead	Skilled Worker	Supervisor of Unit or Function	"Responsible Charge" of Projects	Administrator Of Large Enterprise	Administrator Of Largest Enterprises
Habits of Personal Efficiency	Industrious, Thorough, Accurate, Orderly in Workmanship		Disciplined in Efficiency	Energetic Aggressive Original	Creative Imaginative Farsighted
Traits of Personal Conduct	Honest, Fair and Right in Conduct Persistent Good Sportsmanship		Professionally Ethical in Conduct Measure of Competency and Conduct Qualifying for Licensure and Society Membership	Unselfishly Devoted to Welfare of Profession and Public	Altruistic Inspirational Broad-Visioned Leadership

THE PROFESSIONAL ENGINEER

ADMINISTRATOR OF SCIENTIFIC DEFENSE
DESIGNER OF PLOWSHARES OF PEACE
MOLDER OF HUMAN AND SPIRITUAL VALUES

by

W. R. WOOLRICH, *Dean*
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REGIONAL ADVISER — U. S. DEPARTMENT OF EDUCATION

The Heritage of Engineering: Engineering, Science and Management in Early Ages.

FROM THE DAWN of history engineering principles have been used both for the creation of tools of warfare and the design of implements of peace time industry. Warfare itself has contributed much of the inspiration for new inventions and devices.

The life and death war struggles of men and races have been a challenge for great sacrifices of material and mental wealth to supply new machines of protection and of attack on the one hand, and to furnish the stepped up demands for foodstuffs, shelter, and transportation of the supporting civilians on the other.

That great progress in engineering had been made centuries before Christ is revealed in the sanitary and administrative engineering principles practiced by the Hebrews after their exodus from Egypt. The preserved reports given in the Pentateuch display of knowledge of community sanitation and managerial direction that would be a credit to any modern designer or manager employing similar facilities.

During the medieval dark ages much of this early accumulated engineering knowledge was lost or remained unused in the few isolated libraries of the world. Life became so cheap and human beings so numerous that dictators found it difficult during peace times to keep their millions of serfs or slaves adequately employed. Wars were often instigated by the ruling class to keep the subjects employed in an activity that would reduce the population and raise their individual zeal. By this scheme, threatened revolt was often changed to a display of patriotic action. The great pyramids, the famous roadways, the long walls and remarkable aqueducts of these early periods are monuments to slave labor kept busy by back breaking work that was designed to keep millions of men out of mischief by arduous tasks.

While our modern engineering of civil life is age old in its development, it was not of sufficient strength to command an organization of its own until the period contemporary with the Industrial Revolution. The forerunners of this first organized group were, however, the more isolated geneii of the preceding three hundred years who broke over from the orthodox paths to bring science down to man Such individualists as DaVinci, Columbus, Copernicus, Francis Bacon, and Galileo proclaimed a new philosophy. By their contributions science was made to work for man instead of man decreed to work for science.

The Smeatonians founded the organization of civil life engineers about 1768. The organization was not responsible for the Industrial Revolution, but many of its members were the creative minds that brought about those changes in the machine development of factories that the industrial chaos in manufacturing industries created between 1765 and 1800.

By the opening of the nineteenth century there had developed a great demand for men of military engineering training who had been educated in the physical sciences and who could apply their experiences and knowledge to peaceful pursuits. The name Civil Engineer was coined to distinguish these men from those in military pursuits.

Thomas Tredgold helped establish the first Instution of Civil Engineers in England in 1820. He defined engineering as "The art of directing the great powers of Nature for the service of Man." The American Society of Civil Engineers was organized in America thirty-two years later.

The development of mechanical equipment, the type of equipment which really ushered in the Industrial Revolution, indicated that another type of engineer was in the ascendency. While Civil Engineering had developed primarily for measuring of lands, laying out of highways, and design of buildings, this new type of work involved the design and construction of machines for manufacturing and the application of machine tools to shop production. This new extension of engineering activity led to the third division of engineering, soon to be recognized as the profession of mechanical engineering. The American Society of Mechanical Engineers was organized in New York in 1880.

One hundred years after the Industrial Revolution of England the science of engineering caught its stride in the Nordic world. The pasty sixty years have introduced more changes in mechanical, electrical, chemical, and aeronautical engineering facilities for human beings than had been contributed to the race during any previous six thousand years.

For the most part these new and modern triumphs in engineering were designed to extend and expand the influence of each individual human being and to reduce the drudgery of heavy labor to the masses. This philosophy was just opposite to that of the Pre-Christian Era scientists and philosophers, some of whom periodically gave public orations and lectures urging that none of the inventions of the ruling intelligentsia should be degraded to the point of making artful use of the developments to reduce the amount of hard labor available to keep the common herd busily at work. For the most part inventions and scientific creations of the ancients were designed and consecrated to the use and amusement of the ruling classes.

It is interesting to hear rumblings from certain groups today advocating the same tyrannical philosophy only wrapped in a new sociological cloak. How often we hear the suggestion that invention should be curbed to prevent further inroads of the replacement of men by machines. Is not this a great insult to the intelligence and administrative ability of our public officials and of our educational institutions? Must we condemn a certain portion of our race to the hardest forms of labor just because we are too lazy and too indifferent to utilize our latent abilities and intelligence to keep our industrial and governmental economics apace with our scientific and engineering invention?

It is significant that at the same period that some of our "world uplifters" have convinced themselves that the engineer and the scientist are responsible for all of the world's economic ills and chaos, the leaders of the two European nations which for one hundred years have been heralded as the nations of culture and light should now reveal their true appraisal of the human being. There is every evidence that the ruling powers of these two nations still believe in sacrificing the *many* for the glory of the *few*. They have the same fervor to rise to new heights of public acclamation over the broken bodies of their fellow men as did the intelligentsia of historical Greece, Egypt and Rome.

And Again There Is Call For Engineers:

With the rise of this present perilous threat, there has come with great suddenness an appreciation of the engineer and the scientists in the democratic nations. From coast to coast and from the Gulf to the Great Lakes in the United States there is an urgent appeal for more and more engineers and men of scientific training to produce the necessities of life and to make the machines of defense. Many of the same critics of the self styled economic leaders group who a decade past were unmercifully charging the scientific world with all sorts of mischief are now meekly urging and soliciting the aid of these same scientists they so freely condemned just yesterday.

In the murderous conflict in which the world finds itself, civilization is witnessing the first war in history in which the armed forces are secondary in importance to the men who produce the equipment and machines with which the armed forces must fight. Modern warfare is so completely mechanized that it requires a score of men on production to supply one man in the armed branches of defense. Mechanized warfare is so deadly and destructive that troops improperly armed are slaughtered almost instantly when they meet those who are completely equipped.

For many years the production of American factories was far below their normal capacity. They were confined to peace time activities. On the other hand, in the area that was dominated by the dictator of Berlin, a great manufacturing system for war equipment and supplies was put under way and accumulated a running start of nearly ten years before 1939. Then the Reich struck below the belt and Czechoslovakia, Poland, Denmark, Norway, Albania, Belgium, Holland, France, Jugoslavia, and Greece were struck down by the machines of destruction. Only a few days were required in each case to overpower and enslave each of the powers in successive order.

Great Britain and Russia have been fortunate in warding off the knockout blow. Their existence hangs in the balance. The United States is faced with the necessity of not only preparing to surpass the production within the German State, but must face the problem of producing more than can be produced by all of Continental Europe under German direction. Should Russia go down, the existing nations under subjugation by Germany would be organized in compulsory production provinces to furnish ships, munitions, and supplies under servitude regulations.

Our job is a staggering enterprise and a Herculean task—a challenge to the Engineering, Science, and Management of the nation. Not only must ships, guns, tanks, aeroplanes, ammunition, and motor trucks be made, but to change this continent from a peace time association of states and provinces to a *world arsenal* requires such extensive facilities as shipways, factory buildings, truck roads, employee houses, air and naval bases, and all of the supporting services. Also we must set up the essential equipment and procedures to assure a steady stream of raw materials to move into the production centers from the mines, forests, farms, and wells.

The number of engineers available in the United States in 1939 was barely sufficient for ordinary peace time needs. By July 1940, it became evident that at least 100,000 engineers would be needed to step up production before July 1941.

On July 25, 1940, a bill was prepared requesting Congress to appropriate $14,000,000 for defense training on an engineering college level. Previous to this a companion bill had been passed providing for the training of the necessary tradesmen in trade schools.

On October 9, 1940, Congress passed an act appropriating $9,000,000 for "short engineering courses of college grade provided by engineering schools or by universities of which the engineering school is a part." This bill specified that these should be "courses designed to meet the shortage of engineers with specialized training in fields essential to the National Defense."

By July 1, 1941, over 100,000 men were in the short engineering courses specified in the bill, or had already completed such courses. By far the greater

proportion of those men who were still in the courses and taking work were employed in defense industries and were taking the necessary training during free hours of the day or night. Some of the courses given required only high school education for admission, while others specified advanced engineering work as a prerequisite. Many were of a highly specialized graduate grade.

For the year 1941-1942 Congress has made available $17,500,000 for courses designed to meet the shortage of engineers, chemists, physicists, and production supervisors. Of this amount $16,400,000 has been set aside for engineering courses, $500,000 for the training of advanced chemists, $100,000 for advanced work in physics, and $500,000 for production supervision other than that which normally comes under engineering management. The title of the service was changed from Engineering Defense Training to Engineering, Science, and Management Defense Training.

It is estimated that fully 150,000 additional engineers will be needed during 1941-1942 in addition to the 12,000 senior men who will be available as graduate engineers in June 1942. The present schedule of Engineering, Science, and Management students enrolled in classes indicates that the requirements will be met, and that any failure to tune the American production line up to proposed schedules will not be caused by the shortage of technical men.

Both the Engineering Defense and the Engineering, Science, and Management Defense Training courses are required by law to be of college grade. In no sense do these courses take the place of the regular four-year courses. College credit is not offered for the work although sometimes these courses are as exhaustive as similar work given for college credit, but the incentive and reason for giving an engineering defense course is to train men for defense industry and not to subsidize individuals to earn a college degree.

In general each student enrolls for only one defense course. The pre-service courses require from seven to eight hours per day and continue from six to fifteen weeks. The courses offered men in service usually require from four to eight hours per week and may be from eight to twenty-four weeks in length.

The operation of these courses is vested entirely within the participating college. Each institution has its appointed coordinator and each region its advisor who reports back periodically to the Advisers Committee and the Advisers to the United States Office of Education at Washington.

Every precaution is taken to maintain the standard of the classes at a very high level of effectiveness through the Adviser system and approval methods adopted by the engineering colleges and administered through the Washington Office of Education.

The current law reads:

"For the cost of short courses of college grade provided by degree-granting colleges and universities pursuant to plans submitted by them and approved by the Commissioner, which plans shall be for courses designed to meet the shortage of engineers, chemists, physicists, and production supervisors in fields essential to the national defense, and such plans may provide for regional coordination of the defense training program of the participating colleges and univerisities, $17,500,000: Provided, That only colleges and universities which operate under charters which exempt their educational property from taxation and public degree-granting educational institutions shall be eligible to receive funds herefrom: Provided further, That not to exceed 20 per centum of the amount allotted to any school shall be allotted to it for expenditure for purchase and rental of additional equipment and leasing of additional space found by the Commissioner necessary to carry out its approved plan.

"Under the new Act the training is to be provided by degree-granting colleges and universities. Degree-granting as used therein has been interpreted to mean that the institutions, in recognition of satisfactory completion of a curriculum of four years or longer beyond high school graduation, during the academic year 1940-41 granted degrees with a major leading to a professional career in engineering, chemistry, physics, or production supervision. Institutions will be eligible to conduct courses only in those fields named above in which they have suitable facilities in staff and equipment.

"The organization that was set up to direct the Engineering Defense Training program for 1940-41 has been expanded to include specialists in the new fields of training."

No tuition or other fees are required, but library and similar deposits as guarantees of good faith are sometimes stipulated. Books and instruments are supplied by the individual student. There are no restrictions as to age, color, sex, race, or physical condition except that the student accepted should be employable for the work studied. Each college specifies the scholastic requirements for each course in its preliminary proposals to the Washington office, and these are later checked in the final or operating proposal of the engineering college.

In the State of Texas, Engineering Defense Training courses were given during 1941 by the College of Mines, Southern Methodist University, A. and M. College, College of Arts and Industries, Texas Technological College, and The University of Texas. One thousand four hundred and eighty-four (1,484) engineers were trained in college-grade courses at a cost to the Federal Government of $183,926. Fully 95 per cent of these trainees not already employed were placed immediately in the defense industries of the nation.

By September 30, 1941, 803 students of engineering had been enrolled in the College of Engineering of Texas. Fully 3,000 will be trained during the school year of 1941-1942 in Texas alone.

The Engineer and the Post-War Period:

Let us turn our attention to the years of reconstruction. As was pointed out by Mr. William Batt, in his memorable address at the Annual Meeting of the American Society of Mechanical Engineers, December 1940, in this we see "through a glass darkly."

But with our century of engineering education experience and our two centuries of industrial history, there should be some backsights that will help much in establishing the elevations of the plateaus of the future.

In this emerging period engineers must become more and more the applied economists of production and distribution, not only must they create machines and equipment but they must follow through the discoveries and developments even to their sociological effects upon civilization. They must develop an economy that will provide full time employment to employable citizens. Economic security for all worthy men through the instrument of purposeful work must become a part of our economic goal.

In this coming period, research—significant research—must enter more into the thinking of our engineering faculties. Every engineering college of recognized standing must accept the public responsibility of creating new opportunities to utilize and conserve our natural resources. Out of our college research bureaus should evolve the perfection of methods to utilize our available resources to bring a higher standard of living to all of our people. Associated with this program there should be offered greater encouragement for the development of new inventions and facilities for aggressive promotion of proven machines and equipment developed for the use of all the people.

In this emerging period, engineers should project their engineering method of thinking and study into our civic and cultural life. Many of our theories of government need fundamental and scientific analysis and projection. Much of our public education needs the injection of scientific thought to vitalize it to a usefulness impossible in the so-called "modern education." Our cultural life needs to appraise and define itself in light of our present scientific development. This should embrace a sincere, progressive, and unswerving devotion to the principles of democratic government. Education's greatest responsibility is the interpretation, guidance, and implanting of democratic ideals and tenets, but it must not overlook the fact that the changing civilization demands recognition of scientific advancement, expanded technical horizons and the new social complications and obligations involved therein.

And, finally, engineering, like science, must relate itself more and more to the religious life of the nation. It is in the religion of a people that we find the compelling force that carries them up to new elevations of inspiration and unselfish endeavor. The professional engineer and scientist, trained and educated in the scientific laws eternal, has an endowment that should carry him to heights in life philosophy far above his present accomplishments.

And then it shall be that in these emerging years the engineer will take his rightful place in inculcating and educating the generation at hand in engineering economics, in significant research, in civic and cultural attainment, and into the higher philosophies of life itself. The nation can be most proud of the accomplishment of the engineers in the past one hundred years. With an equal consecration to the task for another century, the faculties of the college of engineering, the engineering societies, and individual engineering accomplishment can elevate the profession to a leadership unchallenged by any of the other professions.

ANNOUNCEMENT:

THE AMERICAN ENGINEER REQUESTS COMMENTS

THE CONTRACT between the National Industrial Publishing Corporation and the National Society of Professional Engineers was signed on February 7th. That the period intervening between the consummation of the agreement and the publication of this issue of The American Engineer was insufficient for the transferral of effects, the collection, selection and adequate editing of material, the preparation of a well planned format, the development and discussion of cover designs, and other features of an up-to-date but dignified publication must be conceded. The absence of any advertising is convincing evidence that not even the publisher had time to further his own interest in the magazine. Editorial, business and publishing representatives join in asking the indulgence of readers. Time, it is hoped, will suffice to overcome many obvious shortcomings and defects in the present number. In the meantime the editorial and management agents of the publication request comments and criticisms. Kindly address:

EDITOR, THE AMERICAN ENGINEER
381 FOURTH AVENUE, NEW YORK, N. Y.

LEGAL AND CONTRACTUAL RELATIONS

and

THE GRADING OF ENGINEERS

by

OLIVER F. ALLEN, *Col. U. S. Reserve*

(Note: This article was prepared by Engineer Allen at the request of the Board of Editors of the 1942 Year Book of the New York State Society of Professional Engineers and has been submitted to the Chapters of that Society for consideration. It is believed that its discussion as well as its proposals will be of interest to all state societies.)

THE MEMBERSHIP of the National Society of Professional Engineers, Inc., includes engineers of various branches, such as Civil, Electrical, Mechanical, and Mining and Metallurgy, embraced in the activities of the four Founder Societies, plus Aeronautical, Agricultural, Automotive, Chemical, Electro-Chemical, Heating and Ventilating, Radio, Public Health, and others, embraced in the activities of other prominent engineering organizations. Fundamentally, the practice of engineering in all of these branches involves substantially the same basic training and experience. These should include an understanding of the social problems of the day and the principles of the ethical and legal relations between the engineer, his employer or client, and the public. The successful and useful engineer must have a sound cultural background. These various attributes cannot be fully acquired in high school or college days nor during the first few years of field work. They must be acquired in constantly increasing value as the engineer practices his profession and makes himself more valuable, not only to himself and to those he is working with, but to the community.

The growth of an engineer's value is largely dependent upon his own initiative and resourcefulness plus his ability to assume responsibility and direct the work of others. It may also be expressed by original contributions which he makes to the progress of engineering, especially in the branch with which he is intimately associated, and the contributions of benefit to his community. What he does beyond his strict duty to employer or client, and especially his work for the benefit of his profession and the public, has great influence on his standing as an engineer.

The practice of the profession of engineering confers certain rights and privileges upon the engineer much as the practice of their profession does for the architect and the lawyer. Relations between the engineer and his client are often of a confidential nature and impose the responsibility of always protecting the client's interests. When the engineer is an employee, the same obligation occurs toward his employer, either public or private. In order that the relationship between the engineer and his client or employer may be clearly understood, their relationship should be defined by a definite, concise contract, preferably in writing, with copies for both parties. In addition to a clear definition of duties, responsibilities, compensation, and method of its payment, such a contract should define the method of its termination by either party and the engineer's powers, if any, as agent of the employer or client.

It is illegal for an engineer to enter into collusion and a moral obligation to observe the ethics of the engineering profession, and to refuse to prepare plans and specifications on a contingent fee basis. It is unfair and in many circumstances illegal for the engineer to receive commissions on materials, devices or inventions used in connection with his work without the prior knowledge and consent of his principals. The engineer is legally obligated to supply reasonable knowledge, skill, and experience related to the work in hand, and to use due care and diligence as well as to employ his best judgment.

If an independent practicing engineer holds a public office, such as City Engineer or member of Board of Public Works, or acts as Consultant for a public body, it is important that private and public business do not get mixed. In cases where the financial responsibility of the client or employer is questionable, the engineer can sometimes better protect himself by investigating and complying with the lien laws so as to be able to take advantage of a mechanics lien. The engineer in responsible charge of work involving the employment of others and relations with adjoining property owners or the public, should see to it that the work is carried on in such a way as to avoid any reasonable claim of negligence against him or his principals.

The ownership of patentable improvements presents a very complicated situation. When an engineer is working on a project involving developments and improvements which may be patentable, he should carefully investigate the legal aspects of the situation in advance and have his relations with it clearly defined in a contract with his principals. Generally speaking, an invention made in line of duty by an employee and directly related to the employee's work belongs to the

employer. Agreements to this effect are customary between engineering and manufacturing concerns and the members of their technical staffs. The characteristics of these agreements are pretty well standardized. If an employee makes a patentable improvement on something outside of the scope of his regular employment, it does not belong to his employer unless previously arranged otherwise, except that if the development of the invention and any plans or models relating thereto are made on the employer's premises the employer has shop rights to the use of the invention.

An engineer acting as Consultant becomes the owner of his inventions unless otherwise agreed with the client, provided, however, that a Consultant working for a client on full time is generally classified the same as an employee in relation to patents. Generally speaking, the terms of employment in the United States do not embrace the foreign patent rights to an invention, and unless specifically provided for in the patent agreement between the principal and the engineer, all foreign patent rights belong to the inventor. An engineer in responsible charge of a project involving the use of patent rights and licenses or the payment of royalty should protect his principal by definite provisions in agreements with contractors defining the use of patented materials or equipment, the payment of royalties, and the responsibility for damages for the use of patented devices and for the infringement of patent rights.

The ownership of drawings, specifications and models is very similar to that of patents. When made by an employee for employer, either public or private, these are definitely the property of the employer, including all notes and studies involved in their preparation. On the other hand, when made by an engineer as a Consultant, unless otherwise provided for in the agreement with the principal, all drawings, specifications, studies and calculations therefor and copies thereof are the personal property of the engineer and may not be used on other work except with his prior approval. To protect himself, his rights and ownership, where an invention, plans, specifications or other similar thing are his property, the engineer may protect his invention by suitable patent applications, and his plans, sketches and designs by copyright.

In the normal progress of many engineering projects, the relations between an engineer, the owner, one or more contractors, an architect, and a public body are involved. These relations are so varied and so frequently controlled by local conditions, that it is impossible to make any general comments on how the engineer should meet any particular situation. There is, however, one fundamental aspect of the matter which should always be kept before the engineer; that is, he can serve only one master. It is his duty to work for and with his employer or client and receive all of his compensation from that employer or client. He cannot ethically or legally serve his principals while accepting fees or other compensation from a manufacturer, a steel fabricator, a contractor, or others, unless previously agreed to by the principals.

A practice which is, unfortunately, all too prevalent in some localities, of reducing the apparent cost of engineering projects by allowing contractors, manufacturers, steel fabricators, or others, to pay part of the engineering fees and expenses, either openly or secretly, is reprehensible, frequently illegal, always unethical, and it is the duty of every professional engineer to do everything which he can to suppress it. Federal and municipal organizations as well as private employers aim to make the compensation paid an engineer correspond to his value and standing, and to increase that compensation as they expand.

It is not feasible at this time to discuss rates of compensation in money terms, but it is believed that some data on the grading of engineers for the purpose of aiding both public and private employers in establishing relative standing and fair rates of pay may prove useful. While some organizations, including the United States Civil Service Commission, have a greater number of grades, it is felt that for the purposes of this Society the classification into seven grades is ample and less liable to confusion. Of these, two grades cover Junior Engineers not qualified for Professional Engineers License under the existing requirements of most of the states, and five grades for Professional Engineers ending with those having the highest qualifications.

In order that this grading may be applicable to all branches of engineering, it is very general in character and intended only as a guide to be supplemented by such special qualifications as may apply to any particular situation. Intermediate grades may be interpolated to meet the needs of large organizations for smaller steps between salary ratings. It is hoped that these data will aid in standardizing the grading of engineers and assist senior engineers and principals in setting fair and uniform rates for their juniors, while at the same time helping the younger engineers to realize what may properly be expected of them in order to attain a higher rating.

Subject to the limitations mentioned above, the following grades are suggested for classifying engineers:

GRADE 1 **(SUB-PROFESSIONAL):**

Duties: Under immediate supervision, to assist on engineering work in field, shop, office or laboratory; to make simple observations, measurements and sketches; to make and check simple computation; to make tracings and simple drawings from sketches; to do neat lettering of various forms; to assist in the compilation of engineering data; to assemble and file engineering plans, specifications and records; to perform the usual work of a Rodman, Chainman, Tracer, Engineering Apprentice, Laboratory Assistant, or Junior Draftsman.

Requirements: Sound physical health with good vision and hearing. Education equivalent to graduation from a standard 4-year high school, with at least 2 years of experience in the branch of engineering in which practicing.

GRADE 2 **(PREPARATORY PROFESSIONAL):**

Duties: Under supervision, to perform technical work in the office, shop, field, or laboratory, requiring a knowledge of engineering practices and methods; to

make minor surveys or working drawings and designs and prepare estimates; to make computations of a technical character; to lay out minor work or set up simple apparatus; to inspect minor construction or fabrication; to make routine tests of equipment, materials, or processes; to perform the usual work of Survey Instrument-Man, Junior Engineer, or Engineering Aid, and the lower grades of Draftsman and Inspector.

Requirements: Sound physical health with good vision and hearing. Education equivalent to graduation from a college or technical school of recognized standing, plus about 2 years of experience on engineering work in the branch of engineering in which practicing; thorough knowledge of the care, operation, and adjustment of engineering instruments and equipment; ability to make reports on work performed in concise, idiomatic English.

Experience of which the greater part is drafting, in the skilled trades, as operator of machinery or other equipment, or as clerk in an engineering office, should not be considered as qualifying.

GRADE 3 **(PROFESSIONAL ENGINEER):**

Duties: Under supervision, to take charge of a field party, a drafting squad, or inspection of construction; to make and check quantity and cost estimates; to lay out work and draw plans and detail drawings; to check working drawings and fabricator's details; to keep records; to make reports in concise and idiomatic English; to perform the usual work of the higher grades of Draftsman, Inspector, Survey Instrument-Man, Laboratory Assistant, Engineering Aid, Detailer, Checker, Squad Boss, Chief of Party, and Assistant Engineer; to undertake minor engineering projects as an independent engineer.

Requirements: Sound physical health with good vision and hearing. Education equivalent to graduation from a college or technical school of recognized standing, plus about 3 years of experience in engineering work in the branch of engineering in which practicing; ability to exercise engineering judgment and skill, and to perform difficult engineering work under only general supervision; ability to plan operations in office, shop, field or laboratory.

Ability to qualify as a Licensed Professional Engineer.

GRADE 4:

Duties: To perform important engineering work in office, shop, field or laboratory requiring the exercise of independent action and decision as well as engineering judgment and skill; to make studies, estimates and reports; to prepare designs and specifications and purchase materials; to lay out and inspect construction or fabrication; to supervise the work of draftsmen, of field parties, or of a group of inspectors on production or construction work; to undertake original research on minor problems; to plan and conduct tests of equipment, materials and processes; to perform the usual work of Designer, Designing Engineer, Associate Engineer, or Engineering Aid in the higher grades, Chief Inspector, or Consulting Engineer in the branch of engineering in which practicing.

Requirements: Sound physical health with good vision and hearing. Education equivalent to graduation from a college or technical school of recognized standing, plus about 5 years of experience in engineering work of which at least two years shall have been equivalent to that indicated for Grade 3; capable of assuming responsible charge of engineering work; eligible for corporate membership in one of the engineering societies of national standing and practicing as a Licensed Professional Engineer.

GRADE 5:

Duties: To perform important engineering work in field, shop, office or laboratory, offering wide latitude of independent action and decision; to be in responsible charge of a minor engineering organization or to have immediate administrative and technical charge of a division in a large organization; to plan, direct and supervise the design and/or construction of engineering projects; to supervise the preparation of specifications and contracts and to be responsible for the technical and business operations of his division, bureau, section, or department; to have immediate responsible supervision of the work of draftsmen, designers, and assistant engineers; to perform the usual work of Engineer, Consulting Engineer, Resident Engineer, Senior Engineer, Section Engineer, Research Engineer, Development Engineer, etc.

Requirements: Sound physical health with good vision and hearing. A first-class technical education, plus about 8 years of professional experience in the active practice of engineering, of which two years shall have been in charge of engineering work of a character indicated for Grade 4, and which has demonstrated a thorough knowledge of engineering principles and their application, marked professional attainment, the ability to organize, direct and coordinate engineering activities of importance, and administrative leadership.

GRADE 6:

Duties: To be in responsible professional and executive charge of a major division of a large or otherwise important engineering, manufacturing, research, or processing project, involving planning, designing, and/or supervision of construction, operation or maintenance; to give independent critical and/or expert engineering advice for executive or legal action; to assume professional and executive responsibility for the whole of a smaller engineering or manufacturing project, to perform the usual work of a Principal Engineer, Division Engineer, Production Engineer, Assistant Chief Engineer of a large organization, or Chief Engineer of a smaller organization; Consulting Engineer including those branches of engineering affiliated with that in which generally practicing.

Requirements: Physical health consistent with the duties to be performed. A first-class technical education supplemented by cultural and economic studies, plus about 11 years of broad professional experience embracing a thorough knowledge of engineering principles and their application, outstanding and widely recognized professional attainments and ability of a very high order in the organization, direction, and co-

ordination of engineering activities of major importance, and administrative leadership of a high type.

GRADE 7:

Duties: To have entire charge of and be responsible for an entire organization comprising more than one engineering division and engaged in more than one class of work; to determine and establish technical and administrative policies and procedures; to be responsible for all engineering, technical and/or administrative operations; to investigate all engineering projects submitted for consideration, and to report critically regarding feasibility, cost, economic justification, and public necessity or convenience; to perform the usual work of a Chief Engineer or Manager of a major organization, or act as Consulting Engineer in all branches of engineering.

Requirements: Physical health consistent with the duties to be performed. A first-class technical education supplemented by cultural, economic, and social studies, plus about 15 years of broad professional experience embracing a thorough knowledge of engineering methods, field work, planning, design, construction, maintenance, operation, engineering economics, contract law, and business administration; recognized standing in the Engineering Profession.

BIBLIOGRAPHY:

This subject of the prerogatives, duties and responsibilities of engineers, their classification and compensation, has been the subject of many studies and is referred to in various books, but the main sources of further information on the subject are the publications of engineering societies.

An excellent bibliography of such publications as of the year 1930 is to be found on page 56 of Manual of Engineering Practice No. 5 of the American Society of Civil Engnieers, entitled "Charges and Method of Making Charges for Professional Services." That manual has been supplemented by the Manual of Engineering Practice No. 6 of the A.S.C.E., September 1930, entitled "Charges for Engineering Services" and Two Reports Prepared for the A.S.C.E. in 1935 entitled "Recommendations for Determining Fees to be Allowed for Professional Engineering Services."

In 1936 the American Institute of Consulting Engineers issued "Report of Development Committee", primarily concerned with ways and means for increasing the usefulness of that Institute, but also of engineers in general.

The Ohio Society of Professional Engineers published "Minimum Fee Schedules—Surveying" in 1938, and "Schedule of Minimum Fees, General Engineering, Etc." revised 1939.

In Section 13 of the "Handbook of Engineering Fundamentals" by Ovid W. Eshbach, John Wiley & Sons, Inc., New York, 1936, Dean Sackett of The Pennsylvania State College discusses contracts. The section contains many pertinent comments on engineers and the practice of their profession.

Further information may also be found in "Business Law for Engineers" by C. F. Allen, McGraw-Hill Book Co., New York, and "Elements of Specification Writing" by R. S. Kirby, John Wiley & Sons, Inc., New York.

The United States Civil Service Examination Announcements for various engineering positions also contain valuable data regarding qualifications and compensation of engineers. These may be obtained at any first or second-class post office or at the United States Civil Service district offices in several large cities.

ANNOUNCEMENT

N. S. P. E. —— ENLARGES HEADQUARTERS

ADDRESS REMAINS NATIONAL PRESS BUILDING, WASHINGTON

DESPITE THE FACT that the Society found it necessary to increase its office space as late as May of last year when it moved to 886-87-88 National Press Building, the developments of the intervening period have called for still greater expansion both as to space and personnel. The present address is 937-38-39-40-41 National Press Building, Washington, D. C.

FOR STATE SOCIETY DIRECTORY

SEE LISTING OF MEMBER SOCIETIES ON PAGE 2.

EDITOR CRAIG TURNS EMISSARY

AS OFFICIAL REPRESENTATIVE OF NATIONAL SOCIETY

RECEIVES WARM WELCOME IN TEXAS

REPORTS ON AFFAIRS IN LONE STAR STATE

TEXAS TRAVELOGUE

Why was the Editor sent to Texas? — Secretary and president were engaged so far ahead that neither could make it — So called on next best — Editor accepted — "Spirit of St. Louis" west to St. Louis via Pennsy — South by Missouri Pacific — to Houston on the "Texan" — West on bus to Beaumont. Ran into National Director, Bob Coltharp on bus — Pleasant companionship — Quartered at Hotel Beaumont — Sabine Chapter, hosts — Large reception committee. Very wholesome two day program devoted chiefly to professional movement — Good attendance in face of war activity — Discussions free and vigorous. — Boat trip down Neches River on yacht Ava to Port Arthur — Griddle cakes in galley — Bus return — 5,000 registered engineers in Texas — T.S.P.E. membership 400 — Magnificent opportunity for growth — Transportation distances great — but new chapters can accrete members and several chapters have opportunity of becoming as large as some State Societies. — T. S. P. E. needs constant encouragement and help from N. S. P. E. — Convention attended by State Board of Registration for Professional Engineers in a body — Talk by Svensen at convention vigorous — Rightor forceful as ever in spite of brand new beard — Miller — Helland — Cruise — Guinn — Twitchell — Warden — Robertson — Pittman — and many others extremely active and have golden opportunity. — Editor enjoyed privilege of twice addressing Texas Society on "Why Engineers Should Have One Integral Society" and on "Why the Engineering Profession Should Advertise" — Integration for strength and recognition — Advertise to acquaint layman with place of engineer in social structure — Convention days were January 23 and 24 — Editor hopes to have more such opportunities. Returned via New Orleans — airplane to Philadelphia — and home.

Robert Hall Craig.

Requested to visit Texas as the representative of N.S.P.E. the editor of The American Engineer does a real reportorial job which might well serve as an example of professional approach for news contributors. An editor with a knowledge of the State and the professional engineer's objectives could, with the aid of this text, easily develop a good story if mere verbiage were required. Here is the reporter's story.

That the Texas Society appreciated the special Ambassador may be gleaned from the following unimpeachable evidence:

Resolution

Sixth Annual Meeting

Texas Society of Professional Engineers

Beaumont, Texas

January 23 and 24, 1942

WHEREAS the Sixth Annual Meeting of the Texas Society of Professional Engineers has been an interesting, instructive, and constructive meeting.

AND WHEREAS the presence of Engineer Robert Hall Craig, Editor of the "American Engineer" and Special Representative of the National Society of Professional Engineers has contributed greatly to the success of the conference by his splendid talks,

NOW THEREFORE BE IT RESOLVED that the State Society of Professional Engineers extend its thanks to Engineer Craig for coming to our meeting and for his excellent talks.

I certify that the above is the true and correct copy of the resolution passed by the Texas Society of Professional Engineers at their Sixth Annual Meeting held in Beaumont on January 23 and 24, 1942.

By R. S. GUINN,

Secretary-Treasurer.

Press reports are evidence of the publicity received.

TENTATIVE PROGRAM
1942 CONVENTION

WEDNESDAY, APRIL 15

State Society Secretaries Conference—A. M.-P. M.
State Secretaries Dinner—Evening

THURSDAY, APRIL 16

Breakfast Meeting, N.S.P.E. Directors
10:00 A. M. Opening Session, New Jersey Society
12:30 P. M. Luncheon—Vice President Krueger presiding
2:30 P. M. Joint Session, Theme—"Present"

Thursday Night—Beach Party in Ambassador Pool

FRIDAY, APRIL 17

Breakfast Meeting State Presidents
10:00 A. M. Opening Session, N.S.P.E.
12:30 P. M. Luncheon
2:30 P. M. Joint Session Theme — "Immediate Future"

Friday Evening, 7:30 P. M.—Annual Banquet and Entertainment

SATURDAY, APRIL 18

Breakfast Meeting—Delegates
10:00 A. M. New Jersey Society Business Session
12:30 Luncheon
2:30 N.S.P.E. Business Session

Evening—Annual Stag Party, N. J. Society

LADIES PROGRAM
1942 CONVENTION

THURSDAY, APRIL 16

2:30 P. M. Get-together and Bridge
Evening—Beach Party, Ambassador Pool

FRIDAY, APRIL 17

2:30 P. M. Style Show, Ambassador Hotel
7:30 P. M. Annual Banquet and Entertainment

SATURDAY, APRIL 18

2:30 P. M. Shopping Tour or visit to Renault's
7:30 P. M. Theatre Party and Buffet Supper — N. J. Society (Ambassador Hotel to furnish transportation)

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APRIL 16 18,

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The Engineer d for

THIS, the Seventh Annual Meeting of the Nati Society of Professional Engineers which will be h in joint session with the Twenty-Second Annual Con tion of the New Jersey Society of Professional Engine will be devoted to the theme "The Engineer mobil for Victory". With this note dominating the three d sessions, there is every reason to expect a capac attendance of Professional Engineers from all parts the country.

While the entire country is geared to the proble of the "All out" War Effort, the engineer is also alre looking ahead to the problems of readjustments fac the World of Tomorrow. Thus it is logical to assu that not only will the Convention be well attended, that it will undoubtedly be one of the most import meetings held since the formation of these Societies

CONVENTION HEADQUARTERS will be in the Amb sador Hotel, located on the Boardwalk at Brigh Avenue. This is one of the outstanding hotels Atlantic City and needs no introduction to Nati Advertisers and Exhibitors. Because of the la attendance expected, it is urged that reservat be made as early as possible. Special rates available to Convention delegates.

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Make reservations now through your Society or apter Secretary or write to the Ambassador Hotel ect. PLEASE ASK FOR SPECIAL ENGINEER'S ONVENTION RATES.

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REPORTS ON VISITS TO SEVERAL STATES — ENGINEERS MAINTAIN INTEREST DESPITE WAR

A NEW STATE SOCIETY IN THE OFFING

As this issue goes to press Secretary Larson has completed six weeks of travel during which time he has visited a dozen states, attended a half dozen important conventions and meetings, delivered several addresses, and held a number of conferences with officers of State Societies and other prominent members of the profession.

Leaving Washington, D. C., on January 15, the first stop was at Jackson, Mississippi, where the Third Annual Convention of the Mississippi Society of Professional Engineers was taking place. The Secretary addressed the Convention on the subject of "The National Government and the Engineer". A comparatively young organization, the Society has built up its membership to well over 150 during the past two years. More important, however, than its numerical strength is the prestige and recognition that it has attained. Informal discussion indicated that the Mississippi Society was looking forward to membership in N. S. P. E. When certain constitutional time requirements have been complied with it is believed likely that a formal application for such membership will be forthcoming. The National Society would welcome the affiliation.

Following the meeting of the Mississippi Society several days were spent in Tennessee discussing engineering and society problems in Memphis, Nashville, Chattanooga and Knoxville. The development of plans for meeting future problems and developing further activities was discussed at length and will be reported in detail to the Board of Directors at its next meeting.

Continuing northward, the next stop was Lexington, Kentucky, where on January 23rd and 24th, the Annual Meeting of the Kentucky Society of Professional Engineers was in progress. Here an address on the subject of The Professional Engineer and National Defense was delivered to the convention. More than 300 engineers attended and participated in a well prepared and interesting program. Speaking at the Annual Banquet Governor Keen Johnson announced the appointment of a distinguished engineer and member of the Society, H. D. Palmore, as a member of the Board of Trustees of the University of Kentucky. The announcement was gratifying to the Society which holds the recipient of the distinction in high esteem. Apparently the Secretary was much impressed by the presence of "an unusually interesting mining engineer of considerable attainment"—Billie M. Wolf, the wife and partner of Engineer H. Comer Wolf. The Board of Directors will want to hear more on this subject. The New York Society has two lady members. Perhaps there are some in other States. The Editor would be interested to hear from such States.

Leaving Kentucky, the itinerary for the following week included visits to Cincinnati, Ohio, Terre Haute, Indiana, St. Louis, Missouri, and East St. Louis, Illinois. The organization of a new and important Chapter of the Ohio Society was the direct occasion of the stop at Cincinnati. From that city to Terre Haute was the next move. Here an extended conference was held with Engineer C. C. Knipmeyer, President of the National Council of State Boards of Engineering Examiners. The policies, aspirations and programs of the two organizations were discussed at length with a view to cooperative and collaborative endeavor in behalf of Regitration and its application. After a meeting with President A. H. Brown, Jr. of the Missouri Society of Professional Engineers, during which the problems of both National and State organizations were considered and the relationship between the two societies discussed, the Secretary moved on to the Annual Convention of the Illinois Society at East St. Louis, Illinois.

The 57th Annual Convention of the Illinois Society of Professional Engineers which was held on January 29, 30 and 31, 1942, attracted some three hundred engineers. Considering the times and the fact that the meeting occurred in a far corner of the State, the attendance was most impressive, as was the program that was carried out. According to Secretary Larson, a stirring address on "The Evacuation of France and the Bombing of London" by the Honorable Corley Smith, British Vice Consul was a highlight that added to the spirit of the Convention.

From Illinois the Secretary returned to Washington where only a brief stay intervened before a trip to New York with President Holbrook to attend a discussion on the preparation of contracts between the National Society and a new publisher for The American Engineer. Returning to Washington long enough to become acquainted with the office staff, a second conference relevant to The American Engineer necessitated a return to New York. This conference concluded, the next move was a visit to Minnesota via Washington.

February 12th, 13th and 14th were spent at Minneapolis, attending a joint meeting of architectural and engineering societies of Minnesota. More than 1,200 persons were present during the various sessions which proved highly illuminatiing to those who listened to the many discussions on problems involving architects and engineers.

A stirring address by Governor Harold E. Stassen of Minnesota featured the Convention which also was addressed by Mayor Kline of Milwaukee, Wisconsin and a number of distinguished representatives of both the Architectural and Engineering professions.

It is encouraging to be able to record the cordial relations that have been established between the Minnesota Association of Professional Engineers and the National Society during the past year. Conferences looking toward affiliation have been in progress for some time and the National Society looks forward with anticipation.

By this time the Secretary has again moved on.

COURT DECISION ON REGISTRATION

BOARD MAY NOT USE POWERS ARBITRARILY

NEBRASKA COURT HOLDS THAT LICENSE MUST BE GRANTED TO APPLICANTS WHO MEET CONDITIONS OF LAW

From Chairman Sacks of the Legislative Committee of N.S.P.E. comes the following:

THIS IS AN ACTION in mandamus brought by the relator, Celwyn Mervyn Downs, wherein he seeks a peremptory writ of mandamus directing the Nebraska State Board of Examiners for Professional Engineers and Architects to issue him a certificate of registration to practice engineering without an examination as provided for by section 9 of Legislative Bill No. 14 of the 1937 session (Comp. St. Supp. 1939, sec. 71-3309). A peremptory writ was issued below, and the board of examiners appeals.

(1) The controlling issues are: Was relator entitled to be registered, was the action of the board arbitrary, and was there an abuse of discretion of the board of examiners. Having resolved these issues in favor of relator, an action in mandamus is the proper remedy. Comp. St. 1929, sec. 20-2156; State v. School District, 31 Neb. 552, 48 N. W. 393; Jackson v. State, 57 Neb. 183, 77 N. W. 662, 42 L. R. A. 792; State v. Lincoln Medical College, 81 Neb. 533, 116 N. W. 294, 17 L. R. A., N. S., 930.

(2) In 1937 there was enacted in our state a new law providing for the first time, regulation of the practice of engineering and architecture, making it a misdemeanor to so practice without a license. The act provided that professional engineers who were residents of the state, of good character, should be issued a certificate of registration to practice engineering without written or oral examination. It defined, substantially, professional engineering as any professional service, such as consultation, investigation, evaluation, planning, design or responsible supervision of construction, when such professional service requires the application of engineering principles and data.

The record reflects that relator had the required residence, paid the fee, is and was a professional engineer within the definition of the statute, of good character, having high scholarship standing, held the degrees of Bachelor of Science in Mechanical Engineering, 1923, Master of Science in Mechanical Engineering, 1924, granted by the University of Nebraska, and had teaching experience in the Engineering department of the University of Nebraska.

The relator was entitled to a certificate of registration under section 9 of the act.

The declaration of policy of the act and as to its construction is found in section 71-3317, Comp. St. Supp. 1939, namely: "The Legislature hereby declares that this act is necessary for the public convenience and welfare, is remedial in nature and shall be construed liberally."

(3) Within the realm of arbitrary action and abuse of discretion of the board, the record shows an unreasonable and inexcusable delay of action in this matter. Application was made to the board by the relator for registration to practice his profession of engineering bearing date of December 27, 1937, and up to the hearing on the mandamus on December 4, 1939, no action by the board had been taken, though requests had been made for such. No valid excuse appears for the delay.

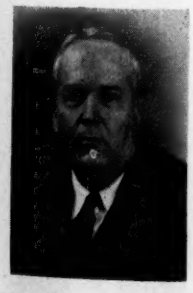
Relator, besides practicing his profession of engineer, is owner and manager of a company which manufactures items made out of paper. A considerable portion of his time is taken up with this company. Yet the board registered the dean of the University of Nebraska Engineering Department to practice the profession of engineering where all his time was taken up with his unversity duties to the exclusion of the practice of his profession. The record fails to show the dean ever practiced his profession of engineering. The board licensed two capable professional engineers, one with all his time taken by his official duties as governor of the state, and the other as member of the state board of control.

An experienced, learned trial judge carefully considered this case below and ordered the writ to issue. The record fully sustains this action; we concur therein, and the judgment of the trial court is

Affirmed.

—*North Western Reporter*

HEADQUARTERS APPOINTS NEW AID—Edwin M. Woods to Assist Secretary



THE BOARD OF DIRECTORS has authorized the appointment of Edwin M. Woods, who will assume the duties of Assistant to Executive Secretary Edward Larson. Engineer Woods has had an excellent training for the role and is highly regarded by his associates. A brief outline of his career follows:

Born: Mobile, Alabama, August 31, 1901. Degrees: B. S. in Civil Engineering, University of Alabama. LL. B. George Washington University.

Instructor of Drafting and Manual Training, Murphy Public High School, Mobile, Alabama, for two years; Instructor of Drafting and Shopwork, Trade School, University of Alabama, one year; Transitman, draftsman, inspector with Alabama, Mississippi and North Carolina Highway Departments, one year each; Structural Engineer, Standard Oil Company, Philadelphia and New York for four and one-half years; Chief of field party, U. S. Geological Survey for three and one-half years; Structural and Civil Engineer, War Department for three and one-half years.

Registered in Pennsylvania. Associate Member, A. S. C. E. Chairman, Publications Committee, N.S.P.E., 1941; Director, D. C. Society of Professional Engineers, 1941.

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